CLAIMS

Necessary claims for 006013

1. An apparatus adapted to determine the binding affinity between a plurality of a certain molecule of a first type and a plurality of a certain molecule of a second type, said apparatus comprises:

   (a) A light source which generates and transmits a certain light signal; and

   (b) An optical waveguide which receives said transmitted light signal in which an evanescent field is generated; and

   (c) processing means, connected to said light source and to said waveguide for using said evanescent field to determine said binding affinity.

2. An apparatus of Claim 1 wherein said molecules of a first type comprise at least a portion of a specific nucleotide and said molecules of a second type comprise at least a portion of a specific protein.

3. An apparatus of Claim 1 wherein said molecules of a first type resemble a ligand and said molecules of a second type comprise at least a portion of a specific protein having affinity for said ligand.

4. An apparatus of Claim 2 wherein said specific protein is a biological receptor and said specific nucleotide is the response element for said receptor.

5. An apparatus of Claim 3 wherein said specific protein is a biological receptor.

6. The apparatus of claim 1 wherein said molecules of a second type further comprises a molecular tag which when bound to said optical waveguide, produces an alteration in a

certain characteristic of light collected from said waveguide in response to said generated evanescent field;

7. The apparatus of claim 1 wherein said optical waveguide comprises an optical fiber.

8. The apparatus of claim 6 wherein said molecular tag is a fluorescent molecule.

9. The apparatus of claim 6wherein said molecular tag is a luminescent molecule.

10. The apparatus of claim 6 wherein said molecular tag absorbs light from said light source.

11. The apparatus of claim 6 wherein said molecular tag alters the polarization of light from said light source.

12. The apparatus of claim 6 wherein said molecules of a second type further comprises a molecular tag which is an enzyme capable of acting upon a substrate so as to produce a chemical substance which when bound to said optical waveguide, produces an alteration in a certain characteristic of light collected from said waveguide.

13. A method to be used with apparatus of Claim 1, said method providing measurement of binding affinity between a plurality of a certain first type of molecule and a plurality of a certain second type of molecule, said method comprising the following steps in combination:

(a) Providing an evanescent sensor apparatus having an optical waveguide and a light source adapted to generate and transmit light to said optical waveguide and a means to collect light from said optical waveguide; and

(b) Causing said optical waveguide to possess a molecular feature resembling at least a portion of said molecules of a first type; and

(c) Providing at least one certain concentration of molecules of the second type, said molecules being tagged with molecules of a chemical belonging to that class of

chemicals which, when bound to said optical waveguide, produces an alteration in a certain characteristic of light collected from said waveguide.

(d) Providing means by which the treated surface of said optical waveguide is brought into to contact with test solutions; and

(f) Providing means for acquiring paired measurements of time and response to light collected from said evanescent sensor, said time measurements having an interval between them which is at most on the order of seconds; and

(g) Bringing one of said concentrations of tagged molecules into contact with said evanescent sensor for a certain period of time while acquiring said paired measurements; and

(h) Removing said concentration of tagged molecules from contact with said evanescent sensor and bringing into contact with said sensor, a solution containing no molecules of said second type, and maintaining contact for a certain time while acquiring additional paired measurements of time and response to light collected from said evanescent sensor; and

(j) Computing said binding affinity between said first type of molecule and said second type of molecule using data from said paired measurements to provide initial rate of binding and initial rate of unbinding for solution of equations relating these rates to binding affinity, said equations being known to those skilled in the art.

14.. A method to be used with apparatus of Claim 1, said method providing measurement of the relative binding activity of a sample, said method comprising in combination:

(a) Providing an evanescent sensor having an optical waveguide and a light source adapted to generate and transmit light to said optical waveguide and collect light from said optical waveguide; and

(b) Causing said optical waveguide to possess a molecular feature resembling at least a portion of said molecules of a first type; and

(c) Providing at least one sample solution containing molecules of the second type, said molecules being tagged with molecules belonging to that class of chemicals which interact with light from said light source in a manner so as to alter a characteristic of light collected after passing through said molecular tags, and said sample being created in a diluent which preserves the binding characteristics of said molecules of said first and second types; and

(d) Creating a calibration standard comprising a relatively low concentration of tagged molecules of a second type, said molecules being from a source having of a certain known binding activity with respect to said molecules of a first type.

(e) Providing means by which the treated surface of said optical waveguide is brought into to contact with test solutions; and

(f) Providing means for acquiring paired measurements of time and response to light collected from said evanescent sensor, said time measurements having an interval between them which is at most on the order of seconds; and

(g) Bringing said calibration standard into contact with said evanescent sensor for a certain period of time while acquiring said paired measurements; and

(h) Removing said calibration standard from contact with said evanescent sensor and bringing into contact with said sensor, said sample solution for a certain period of time while acquiring said paired measurements; and

(i) Dividing data acquired in step (h) by data acquired in step (g) for each identical time point and defining the asymptote approached by said division as S/C, and comparing

the quantity S/C for all samples utilizing identical calibration standards to provide relative binding activities between said samples.

15. A method to be used with apparatus of Claim 1, said method providing measurement of the effective binding affinities between a plurality of a certain first type of molecule and a plurality of a certain second type of molecule when said molecules exhibit co-operative binding behavior, said method comprising in combination:

(a) Providing evanescent sensors having an optical waveguide and a light source adapted to generate and transmit light to said optical waveguide and collect light from said optical waveguide; and

(b) Causing said optical waveguide to possess a molecular feature resembling at least a portion of said molecules of a first type; and

(c) Providing a solution containing certain molecules of said second type, said molecules being tagged with molecules belonging to that class of chemicals which interact with light from said light source in a manner so as to alter a characteristic of light collected after passing through said molecular tags; and

(d) Creating a calibration standard comprising a relatively low concentration of said tagged molecules of a second type

(e) Creating several dilutions of a standard sample, said standard sample dilutions comprising molecules having a certain known binding affinity with respect to molecules of said second type, said dilutions also containing a certain concentration of said tagged molecules of said second type

(f) Creating several dilutions of a test sample, said test sample dilutions comprising molecules having with respect to molecules of said second type, a binding affinity which is to be measured, said dilutions also containing a certain concentration of said

tagged molecules of said second type, said certain concentration being identical to that used to create standard sample dilutions.

(g) Providing means by which the treated surface of each of said optical waveguides is brought into to contact with solutions; and

(h Providing means for acquiring paired measurements of time and response to light collected from said evanescent sensor, said time measurements having an interval between them which is at most on the order of seconds; and

(i) Bringing said calibration standard into contact with a first evanescent sensor for a certain period of time while acquiring said paired measurements; and

(j) Removing said calibration standard from contact with said first evanescent sensor and bringing into contact with said sensor, said one dilution of a sample solution for a certain period of time while acquiring said paired measurements; and

(k) . Dividing data acquired in step (k) by data acquired in step (j) for each identical time point and defining the asymptote approached by said division as S/C; and

(l) Repeating steps (j), (k) and (l) for each test sample dilution and each standard dilution; and

(m) Identifying from said S/C calculations performed on said standard sample solutions, that concentration for which the quantity S/C is the highest; and

(n) Identifying from said S/C calculations performed on said test sample solutions, that concentration for which the quantity S/C is the highest; and

(o) Computing the effective binding affinity of said test sample for said molecules of the second type from known relationship between S/C and the affinity constants and concentrations of test and standard solutions.

16. An optical sensing apparatus for measuring parameters describing the binding between a plurality of a certain first type of molecule and a plurality of a certain second type of molecule, said apparatus comprising in combination:

(a) An optical apparatus which generates, transmits and collects a certain light signal; and

(b) An optical waveguide which receives said transmitted light signal in which an evanescent field is generated, said waveguide being treated so as to attach a plurality of a certain molecule of a first type, in close proximity to at least a portion of the surface of said waveguide, said surface extending in a direction parallel to the direction of transmission of said light through said waveguide; and

(c) A means of directing light into said optical waveguide at an angle so as to produce interaction between said light and said plurality of a certain molecule of a first type; and

(d) A plurality of a certain molecule of a second type, said second type being present in a solution which is brought into contact with said waveguide surface, said molecules of a second type being tagged with a molecular tag comprising molecules belonging to a class of chemicals which interact with light in a manner so as to alter a measurable characteristic of light impinging upon said molecules; and

(e) A processing means for measuring a characteristic of light passing though said optical waveguide, said characteristic being alterable by said tagged molecules which are held in close proximity to at least a portion of a surface of said waveguide, said processing means also using said measurement to provide parameters describing the binding between a plurality of a certain first type of molecule and a plurality of a certain second type of molecule.

17. An apparatus of Claim 16 wherein said optical waveguide is an optical fiber

18. An apparatus of Claim 16 wherein said means of directing light into said optical waveguide directs into said waveguide an annular beam of light at or near an angle such that total internal reflection in induced within said optical waveguide so as to produce an evanescent field extending outward from said waveguide.

19. An apparatus of Claim 18 wherein said annular beam of light at or near said angle is produced by directing means which injects a collimated light beam emerging from a focusing means into an annularizing optical fiber at an angle such that the conical ray bundle produced within it, propagates at an angle which corresponds to the critical angle required for the attached chemically sensitized evanescent fiber sensor immersed in the liquid medium being analyzed.

20. An apparatus of Claim 19 wherein said directing means is mounted on a translatable mount so as to enable adjustment of said angle at which rays are injected.

21. An apparatus of Claim 20 wherein said translatable mount is positioned so that the axis along which translation occurs is perpendicular to the longitudinal axis of said focusing means.

22. An apparatus of Claim 19 wherein said annularizing optical fiber is butt coupled to the proximal end of said optical fiber waveguide so as to transfer light between the two fibers.

23. An apparatus of Claim 22 wherein said annularizing fiber and the side surface of the proximal end of said optical fiber waveguide are both clad with a material having a refractive index which is less than that of the material comprising said optical waveguide and approximately equal to or less than that of the said solution in contact with said waveguide.

24. An apparatus of Claim 22 wherein said means of butt coupling said fibers is a coupling capillary comprising a cylindrical tube of capillary dimensions having internal radius so as to permit entry of said clad fibers into the interior of said capillary while constraining the position of said fibers in all directions outward from the radial center of said fibers.

25. An apparatus of Claim 16 wherein said contact between said waveguide surface and said molecules of a second type is achieved by bringing said molecules of a second type into a sensor cartridge, said sensor cartridge comprising in combination:

(a) An optical fiber waveguide, said waveguide having been at least partially stripped of its cladding in a central portion while possessing cladding of Claim 8 along the longitudinal surface of its proximal end, and said central portion having been treated so as to hold in proximity to the longitudinal surface of said optical fiber said plurality of a certain molecule of a first type; and

(b) Fluid ferrules which position said fiber assembly within said cylindrical tube, said cylindrical tube being of capillary dimensions, said end caps possessing holes providing means through which solution may enter and exit said capillary tube, and said end caps also provided with sealing means so as to prevent leaking of said solution at points where said optical fiber and said cylindrical tube contact said fluid ferrules.

26. An apparatus of Claim 25 wherein said optical fiber waveguide has a protective sheath surrounding said cladding along the longitudinal surface of its proximal end.

27. An apparatus of Claim 25 wherein said optical fiber waveguide has a network of hydrophobic regions on said central portion, said regions being spaced so as to prevent large molecules from contacting the surface of said optical fiber while permitting small molecules to contact and said central surface so as to allow chemical sensitization of said central portion of said optical fiber waveguide.

28. An method of Claim 27 wherein said hydrophobic regions are achieved by incomplete dissolution of a hydrophobic cladding material on said optical fiber waveguide.

29. A method of Claim 28 wherein said cladding material is a member of a class of chemicals known as amorphous copolymers of perfluoro (22,dimethyl-1,3 dioxole) and tetrafluoroethylene, such as and without limitation Teflon AF™ and said dissolution is achieved by means of a solvent belonging to that class of chemicals known as perfluoroalkanes, such as and without limitation, FLUORINERT FC-75™.

30. An apparatus for positioning fiber optic sensor cartridge of Claim 25 with respect to a coupling optical fiber, said coupling optical fiber being connected to an optical excitation means, said apparatus comprising:

(a) A coupling capillary having a bore diameter such that said the distal end of said coupling optical fiber is held substantially in contact with the proximal end of an optical fiber comprising the fiber core of a fiber optic sensor cartridge, said coupling capillary having the effect of substantially constraining position of the two optical fibers transverse to their axes; and

(b) A means of supporting said fiber optic sensor cartridge, said means being adapted to slide said fiber optic sensor cartridge into said coupling capillary.

31. An apparatus for positioning a fiber optic sensor cartridge with respect to a coupling optical fiber, said coupling optical fiber being connected to an optical excitation means, and to a detection means, said apparatus comprising:

(a) A coupling capillary having a bore diameter such that said the distal end of said coupling optical fiber is held substantially in contact with the proximal end of an optical fiber comprising the fiber core of a fiber optic sensor cartridge, said coupling capillary having the effect of substantially constraining the position of the two optical fibers transverse to their axes; and

(b) A means of supporting said fiber optic sensor cartridge, said means being adapted to slide said fiber optic sensor cartridge into said coupling capillary.

32. An apparatus of claim 30 where said coupling optical fiber delivers an annularized beam of light, said annular beam containing light substantially at or near the critical angle for the fiber optic sensor.

33. An apparatus of claim 31 where said coupling optical fiber delivers an annularized beam of light, said annular beam containing light substantially at or near the critical angle for the fiber optic sensor, said coupling optical fiber also collecting light which comes from said fiber optic sensor cartridge.

34. An apparatus of Claim 33, said apparatus comprising in combination:

(a) A positioning apparatus body having a front surface into which is carved a first groove, said groove being of dimensions so as to support one half of said sensor cartridge end caps, said groove also possessing delivery means by which solution may be delivered into said holes of said end caps; and

(b) Two hinged supports attaching to said positioning apparatus body, said supports possessing an inner surface into which is carved a second groove, said groove being of dimensions so as to support one half of said sensor cartridge end caps, said hinged supports also being provided with a means by which said supports may be tightly closed so as to firmly hold sensor cartridge end caps against both grooves, and provide a leak proof seal between said delivery means and said holes in said end caps; and

(c) Translating means onto which is mounted said positioning apparatus body, said translating means sliding a along track; and

(d) Support means onto which is mounted said track and also onto which is mounted said coupling capillary, said components being positioned in a manner such that the proximal end of said optical fiber waveguide contained within said sensor cartridge is brought into said coupling capillary when said positioning apparatus body is translated along said track in the direction of said capillary coupler; and

(e) Locking means by which said positioning apparatus body may be held so as to maintain butt coupling between said optical fiber waveguide and said annularizing fiber, said locking means also being capable of release so that said positioning apparatus body may be separated from said coupling capillary.

35. An optical apparatus of claim 16 comprising in combination:

(a) A light source which generates and transmits a certain light signal; and

(b) A dispersive element situated such that light propagating from said light source impinges upon said dispersive element. Said impingent light, upon exiting from said dispersive element, thereafter propagates such that each constituent wavelength component of light is angularly dispersed as a function of wavelength. Said dispersive element functions to angularly separate unwanted wavelength band(s) from wanted wavelength band(s); and

(c) A means of directing said angularly dispersed light along a path of substantial distance. Said distance is substantial when the path length is sufficient to spatially separate unwanted wavelength band(s) from wanted wavelength band(s); and

(d) Blocking element(s) situated at said substantial distance to said dispersive element. Said blocking element(s) intercept only unwanted wavelength band(s). Selected wavelength band(s) are not intercepted by said blocking element(s), and thus, continue to propagate; and

(e) Means of directing said selected wavelength band(s) into an optical fiber at an angle so as to cause said wavelength bands to propagate as real modes in a substantially confined manner within said optical fiber such that said selected wavelength band(s) emerge from the distal end of said optical fiber in an annular ring having a certain cone angle; and

(f) Means of coupling said optical fiber to a second optical fiber, said second fiber being treated so as to attach a plurality of a certain molecule of a first type, in close proximity to at least a portion of the surface of said waveguide, said surface extending in a direction parallel to the direction of transmission of said light through said waveguide, and said second fiber comprising a part of a fiber optic sensor; and

(g) Means of introducing test and reagent solution(s) into contact with the surface of said second optical fiber; and

(h) Means of collecting light returning from said second optical fiber and directing said light so as to allow light having a specific characteristic to be focused upon a photodetector, while reflected light from the original light source which lacks said specific characteristic is rejected; and

(i) Means for processing a signal generated by said photodetector.

36. An apparatus of Claim 35 wherein said light source comprises a laser diode.

37. An apparatus of Claim 35 wherein said specific characteristic of light comprises a certain wavelength bundle produced by fluorescent molecules, said fluorescent molecules having become bound to said plurality of molecules held in close proximity to the surface of said second fiber.

38. An apparatus of Claim 35 wherein said certain cone angle is such that light entering said second optical fiber generates an evanescent field at the surface of said second optical fiber.

39. An apparatus of Claim 35 wherein the surface of said second optical fiber possesses a network of hydrophobic regions, said regions functioning to reduce nonspecific binding of proteins to said surface.

40. An apparatus which removes unwanted spectral features from said light sources, said apparatus comprising in combination:

(a) A light source; and

(b) A dispersive element which is placed in the optical path the ray bundle emerging from said light source to be subsequently directed upon a fluorescence sample. The light is angularly dispersed by said dispersive element as a function of its wavelength; and

(c) Blocking element(s) which select a wanted wavelength bandwidth and reject others; and

(d) A means of directing said angularly dispersed light into said blocking elements.

41. Apparatus of claim 40wherein said light source comprises a laser diode.

42. Apparatus of claim 40 wherein said dispersive element comprises a grating.

43. An affinity determining assembly of Claim 16 wherein said optical evanescent sensor comprises said optical apparatus of Claim 35; and said sensor cartridge comprises apparatus of Claim 25, said sensor cartridge being optically coupled to said optical apparatus by means of positioning apparatus of Claims 30 and 31.

44. The apparatus of claim 16 wherein said certain first type of molecule is a specific nucleotide and said certain second type of molecule is a specific protein.

45. The apparatus of claim 16 wherein said certain first type of molecule is a specific ligand and said certain second type of molecule is a specific protein.

46. The apparatus of claim 44 wherein said specific protein is at least a portion of a biological receptor and said specific nucleotide is at least a portion of a biological response element for said biological receptor.

47. The apparatus of claim 43 wherein said specific protein is at least a portion of a hormone receptor and said specific ligand is a hormone known to have a binding affinity for said hormone receptor.

48 The apparatus of claim 43 wherein said biological receptor is an estrogen receptor and said specific nucleotide is an estrogen response element.

49. The apparatus of claim 43 wherein said biological receptor is an estrogen receptor and said hormone is an estrogen.

50. A method for performing an assay of certain protein, said method comprises the steps of:

(a) Providing An optical evanescent sensor adapted to receive light, to internally reflect said received light, and to generate an evanescent field, said sensor possessing a molecular feature which comprises a nucleotide having a binding affinity for said protein,

(b) Tagging said protein with molecules which, when bound to said waveguide, produce an alteration in the response of said optical waveguide to said evanescent field; and

(c) Placing said evanescent sensor into a solution containing said protein and measuring the response of said sensor to said evanescent field.

51. An apparatus adapted for measurement of proteins which regulate growth and differentiation and for distinguishing wild type forms of said products from mutations, said apparatus comprising:

(a) A light source adapted to generate a light signal; and

(b) At least one evanescent sensor in communication with said light signal, said sensor possessing a molecular feature which comprises a nucleotide resembling the nuclear response element for a protein which regulates growth and differentiation ; and

(c) At least one of a second evanescent sensor in communication with said light signal, said sensor possessing a different molecular feature which has binding affinity for said protein; and

(d) Sensor cartridges which enable the surface of said optical evanescent sensors to selectively contact test solutions; and

(e) At least one container having a concentration of wild type molecules of said protein, said wild type protein having been tagged with molecules which, when bound to said optical waveguide, produce an alteration in a certain characteristic of light collected from said waveguide in response to said generated evanescent field;

(f) At least one container having a sample in which tagged antibody to said protein has been added to a sample of said protein to be measured and evaluated for mutation, said tagged antibody, when brought to the surface of said optical waveguide, producing an alteration in a certain characteristic of light collected from said waveguide in response to said generated evanescent field;

(g) Processing means for measuring said certain characteristic of light collected from said optical waveguide in response to said generated evanescent field within said optical waveguide.

52. A method for measurement of proteins in control of growth and differentiation and for distinguishing wild type forms of said products from mutations, said method comprising:

(a) Providing at least one optical evanescent sensor of claim 51; and

(b) Injecting light into said optical waveguide at or substantially near the critical angle of the waveguide in a sample; and

(c) Bringing said sensor cartridges into contact with said tagged wild type of said protein and measuring the response of said evanescent sensor to said evanescent field; and

(d) Bringing said sensor cartridges into contact with said sample to be evaluated, said sample containing said tagged antibody to said protein, and measuring the response of said evanescent sensor to said evanescent field; and

(f) Comparing the response obtained from sensors used with said wild type protein and those used with sample being tested.

53. An apparatus of claim 51 where the sample to be tested is derived from a tumor tissue biopsy.

54. An apparatus of claim 51 where said protein is p53 protein.

55. An apparatus of claim 51 wherein said molecular tag comprises a fluorescent molecule.

56. An apparatus adapted for measurement of proteins in control of growth and differentiation and for distinguishing wild type forms of said products from mutations, said apparatus comprising:

(a) A light source adapted to generate a light signal; and

(b) At least one evanescent sensor in communication with said light signal, said sensor possessing a molecular feature which comprises a nucleotide resembling the nuclear response element for said protein; and

(c) At least one of a second evanescent sensor in communication with said light signal, said sensor possessing a different molecular feature which has binding affinity for said protein ; and

(d) Sensor cartridges which enable the surface of said optical evanescent sensors to selectively contact test solutions; and

(e) At least one container having a sample in which said protein is to be measured and evaluated for mutation, to which has been added tagged antibody to said protein, said tagged antibody producing an alteration in the response of said optical waveguide to said evanescent field; and

(f) Processing means for measuring said certain characteristic of light collected from said optical waveguide in response to said generated evanescent field within said optical waveguide.

57. A method for measurement of proteins in control of growth and differentiation and for distinguishing wild type forms of said products from mutations, said method comprising:

(a) Providing at least one optical evanescent sensor of claim 56; and

(b) Injecting light into said optical waveguide at or substantially near the critical angle of the waveguide in a sample; and

(c) Bringing said sensor cartridges into contact with said sample to be evaluated, said sample containing said tagged antibody to said protein, and measuring the response of said evanescent sensor to said evanescent field.

58. An apparatus of claim 56 where the sample to be tested is derived from a tumor tissue biopsy.

59. An apparatus of claim 56 where the protein is p53 protein.

60. An apparatus of claim 56 wherein said molecular tag comprises a fluorescent molecule.

61. An apparatus of claim 56 wherein said molecular tag comprises an enzyme capable of acting upon a substrate so as to produce a chemical substance which, when bound to said optical waveguide, produces an alteration in a certain characteristic of light collected from said waveguide.

62. A method for manufacturing senor fibers having identical surface chemistries and thus sensitivities to their target analytes, in which large quantifies of sensor fibers may be chemically sensitized together by using a carrier capable of holding a plurality of fiber and in which the carrier is filled with fiber sections:

(a) Cut from a longer length of multimode fiber having a high index core material such as and without limitation, fused silica, and covered with a low refractive index cladding material such as and without limitation amorphous copolymers of perfluoro (2,2-dimethyl-1,3 dioxole) and tetrafluoroethylene (e.g.Teflon AF™); and

(b) The distal and proximal ends of said clad fiber sections are covered in a protective sheath means, such as and without limitation, polyimide plastic material, which is sufficiently inert to the solutions to be used in preparing the sensitized fibers and which is tightly sealed to said fiber cladding means by means such as and without limitation heat shrinking of sheathing tubes to the clad fibers, so as to prevent said solutions from touching the cladding means sealed beneath the protective sheaths, and which sheath means may be used for handling the fibers without damaging the sensitized fiber regions after all processing steps are completed.

63. The methods of claim 62 in which one or more carriers are used to convey a plurality of clad fiber sections, said fiber sections having protective sheathing means sealed to their proximal and distal ends through a series of sequential processing steps which include:

(a) Immersing said clad fiber surfaces in a series of cleaning and rinsing solution means to remove surface contamination, where said cleaning and rinsing solutions means may utilize ultrasonic transducers or other forms of solution agitation both external to or internal to the carrier to enhance the ability of cleaning and rinsing solutions to remove surface contamination; and

(b) Drying said cleaned fibers to remove all traces of solutions used in cleaning; and

(c) Placing said cleaned fibers in an atmosphere which excludes reactive gaseous components such as but not limited to, water vapor, which can interfere with subsequent chemical sensitization or processing steps; and

(d) Immersing said clad fiber surfaces in solvent means which dissolves and removes controlled amounts of said cladding material from the unsheathed sections of fiber without dissolving the cladding under the sheathed sections of fiber, where such cladding material may be but is not limited to amorphous copolymers of perfluoro (2,2-dimethyl-1,3 dioxole) and tetrafluoroethylene, e.g., Teflon AF™ and the solvent used for disolving controlled amounts of this cladding material may comprise but is not limited to a mixture of perfluorinated alkanes, such as and without limitation the mixture known as FLUORINERT FC-75™; and

(e) Dissolving or otherwise removing the cladding means surrounding the silica fiber surfaces of the unsheathed sections of said clad fibers except for a controlled residue of cladding means which provides a network of protective hydrophobic regions of cladding material interspersed with clean bare surface regions of said fiber core material; and

(f) Subsequently processing the fiber sections to sensitize them to the analyte to be measured, by the sequentially immersing said carrier in chemical and rinse solutions.

64. A means of protecting surfaces glass or silicon sensor surfaces with enhanced protection from the non-specific binding of protein to said surfaces by using a solvent such as but not limited to the mixture of perfluorinated alkanes, such as and without limitation known as FLUORINERT FC-75™, to substantially remove all of a surface cladding means such as and without limitation the amorphous copolymers of perfluoro (2,2-dimethyl-1,3 dioxole) and tetrafluoroethylene, known as Teflon AF™, except for nearly undetectable trace amounts of contamination from constituents of said cladding which form an open network elevated regions surrounding the underlying clean, bare, glass or silicon surface regions.